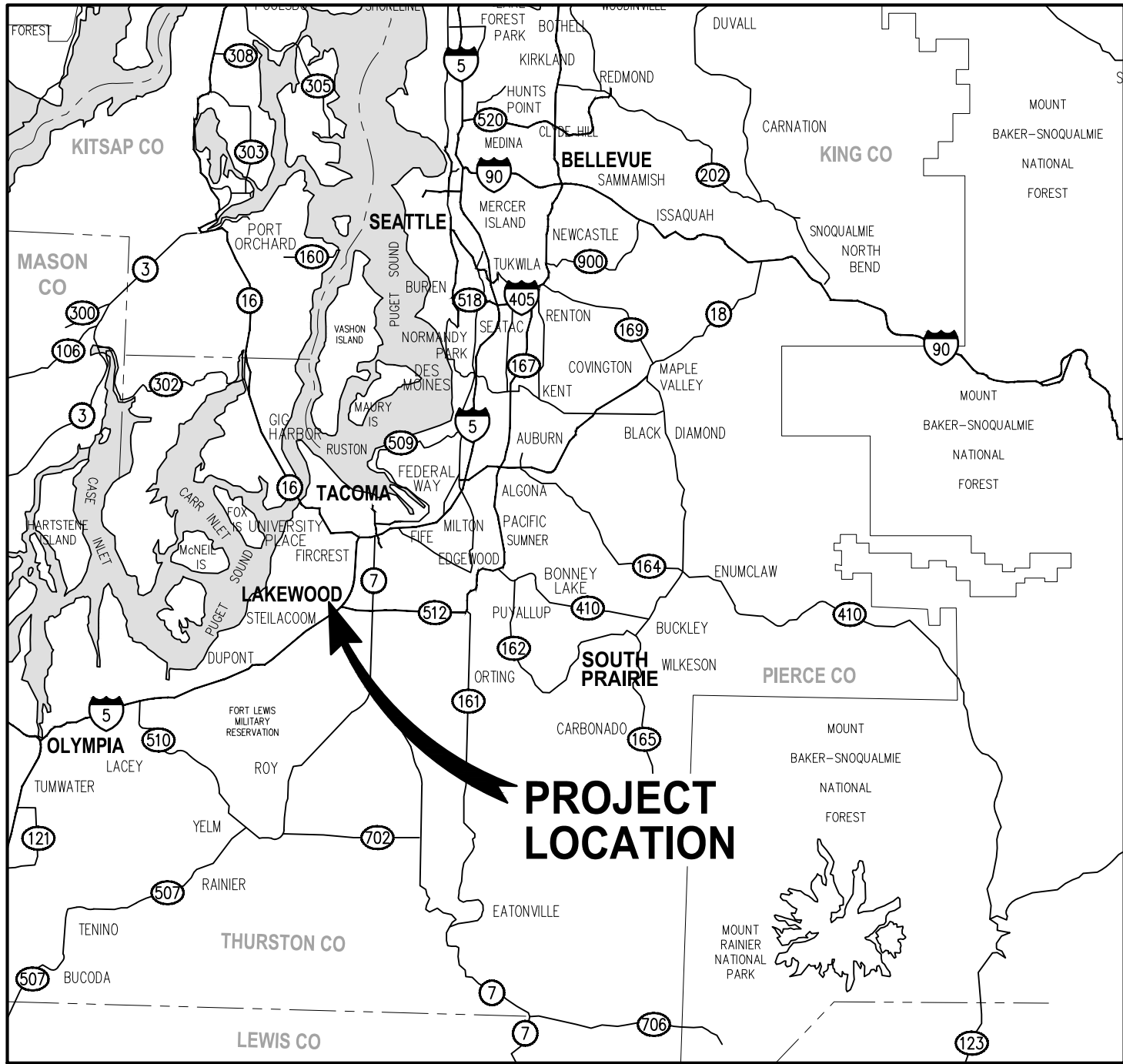
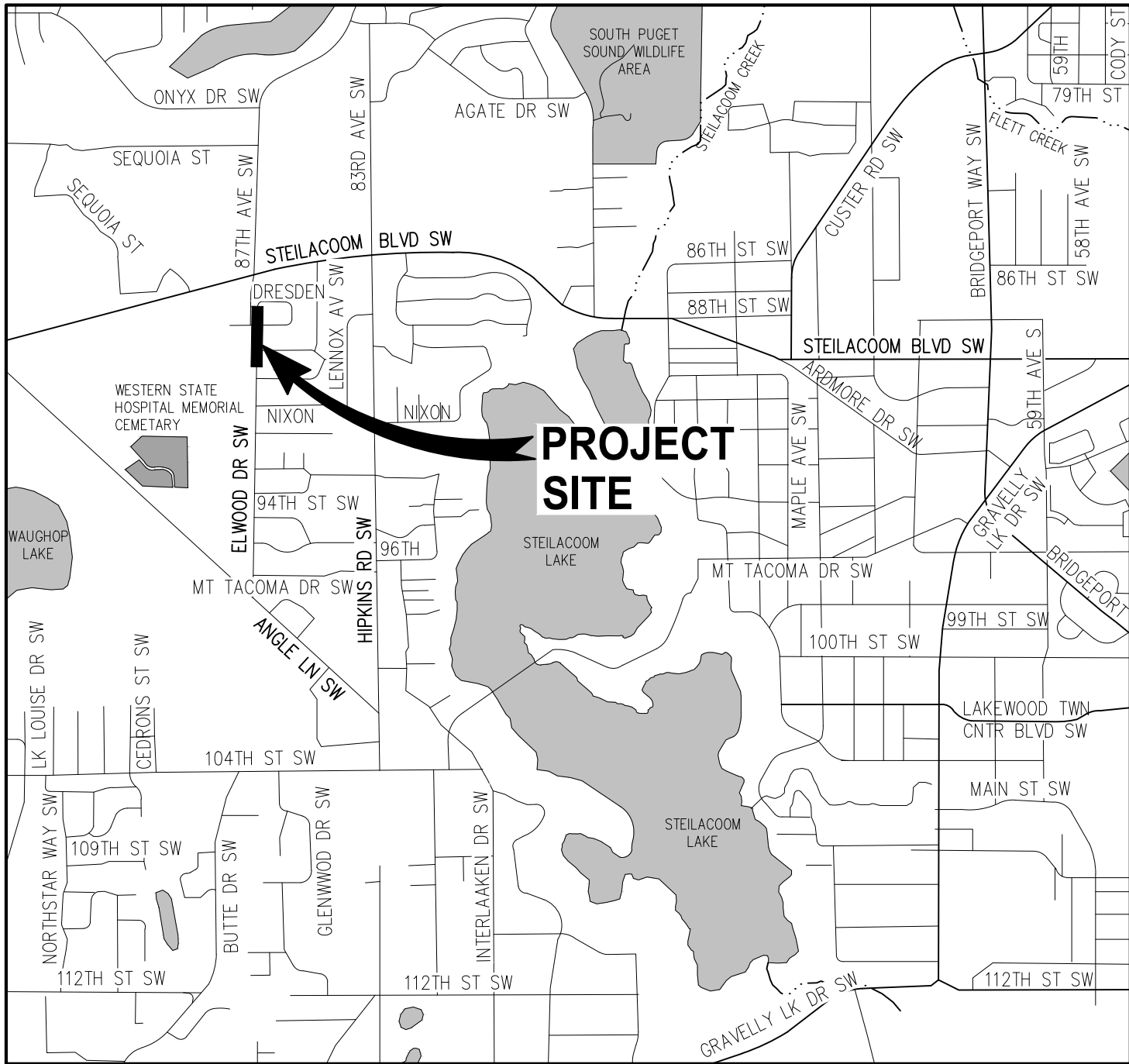


LAKEWOOD WATER DISTRICT
ANGLE LANE SW & ELWOOD DR SW
WATER MAIN RELOCATION
CITY PROJECT NO. 302.0156
APRIL 2023



LOCATION MAP
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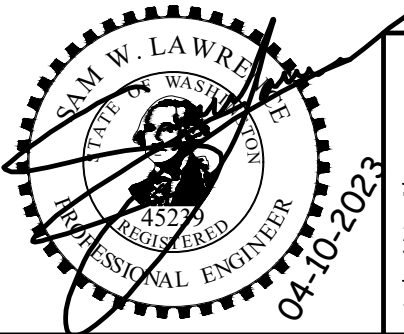
VICINITY MAP
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DRAWING INDEX	
SHEET	DRAWING TITLE
1	COVER SHEET
2	LEGEND, ABBREVIATIONS & GENERAL NOTES
3	SURVEY CONTROL & ALIGNMENT DATA
4 - 5	WATER PLAN & PROFILES
6 - 7	SCHEMATIC CONNECTION DETAILS
8	PROJECT DETAILS
9 - 11	LAKEWOOD WATER DISTRICT STANDARD DETAILS
12	EXISTING CONDITION PLAN

CALL 3 DAYS
BEFORE YOU DIG
811

NO.	DATE	BY	APPR.	REVISIONS

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ENGINEERING MANAGER	DATE	FILENAME
PROJECT MANAGER	DATE	DESIGNED BY
PROJECT ENGINEER	DATE	DRAWN BY
		CES
		DATE
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		DATE



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LAKEWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION

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LEGEND

EXISTING		PROPOSED	
	FOUND MONUMENT AS NOTED		PROPOSED WATER MAIN
	SET NAIL AND WASHER		
	BOLLARD		GATE VALVE
	MAIL BOX		
	SIGN		COUPLING/LONG SLEEVE
	CLEANOUT		
	SANITARY SEWER MANHOLE		TEE
	STORM CATCH BASIN		
	GAS METER		METER
	GAS VALVE		
	TRAFFIC SIGNAL POLE W/ LIGHT		REDUCER
	TRAFFIC CABINET		
	GUY ANCHOR		THRUST BLOCK
	UTILITY POWER POLE		
	JUNCTION BOX		CAP
	STREET LIGHT		
	POWER VAULT		WATER LINE TO BE REMOVED OR ABANDONED PER SPECIAL PROVISIONS
	LUMINAIRE		
	TELEPHONE VAULT		
	FIRE HYDRANT		FIRE HYDRANT
	IRRIGATION CONTROL VALVE		
	WATER METER		AIR VAC ASSEMBLY
	WATER VALVE		
	CONIFEROUS TREE		NEW ASPHALT PAVEMENT
	DECIDUOUS TREE		BACKFILL PER SPECIAL PROVISIONS
	SD STORM LINE		
	S SEWER LINE		
	W WATER LINE		
	G GAS LINE		
	BP BURIED ELECTRICAL LINE BURIED		
	T COMMUNICATION LINE		
	X FENCE		

ABBREVIATIONS

AC	ASBESTOS CONCRETE	HP	HIGH POINT	PVI	POINT OF VERTICAL
ACP	ASPHALT CONCRETE PAVEMENT	ID	INSIDE DIAMETER	R	RADIUS
ADA	AMERICANS WITH DISABILITIES ACT	IE	INVERT ELEVATION	RAB	ROUND A BOUT
ALT	ALTERNATE	L	LENGTH	REQD	REQUIRED
AP	ANGLE POINT	LF	LINEAR FEET	RP	RADIUS POINT
APPROX	APPROXIMATE	LP	LOW POINT	RT	RIGHT
AVE	AVENUE	LT	LEFT	R/W, ROW	RIGHT OF WAY
BLDG	BUILDING	LWD	LAKEWOOD WATER DISTRICT	S	SLOPE/SOUTH
BOW	BOTTOM OF WALL	MAX	MAXIMUM	SD	STORM DRAIN
CB	CATCH BASIN	MDD	MAXIMUM DRY DENSITY	SS	SANITARY SEWER
CDF	CONTROLLED DENSITY FILL	MIC	MONUMENT IN CASE	SHT	SHEET
CHAN	CHANNELIZATION	MIL	MILLIMETER	SPEC	SPECIFICATIONS
C ,CL, C	CENTERLINE	MIN	MINIMUM	SSMH	SANITARY SEWER MANHOLE
CL	CLASS	MH	MANHOLE	ST	STREET
CO	CLEANOUT	MISC	MISCELLANEOUS	STA	STATION
CONC	CONCRETE	MJ	MECHANICAL JOINT	STD	STANDARD
COLW	CITY OF LAKEWOOD	MON	MONUMENT	T	TANGENT LENGTH
CSBC	CRUSHED SURFACING BASE COURSE	MSE	MECHANICALLY STABILIZED EARTH	TEMP	TEMPORARY
CSTC	CRUSHED SURFACING TOP COURSE	N	NORTHING/NORTH	TOC	TOP OF CURB
DET	DETAIL	NO,#	NUMBER	TOG	TOP OF GRATE
DIAM, Ø	DIAMETER	NTS	NOT TO SCALE	TOW	TOP OF WALL
DIP/DI	DUCTILE IRON PIPE	O.C.	ON CENTER	TYP	TYPICAL
DW	DRIVEWAY	O.D.	OUTSIDE DIAMETER	UNK	UNKNOWN
E	EASTING/EAST	PC	POINT OF CURVATURE	VC	VERTICAL CURVE
EL/ELEV	ELEVATION	PCC	POINT OF CURVE ON CURVE	VERT	VERTICAL
EOP	EDGE OF PAVEMENT	PCC	PORTLAND CEMENT CONCRETE	W	WATER, WEST
EX/EXIST	EXISTING	PE	POLYETHYLENE	WM	WATERMAIN
FL	FLANGE/FLOWLINE	PI	POINT OF INTERSECTION	W/	WITH
FOC	FACE OF CURB	PIV	PRESSURE INDICATOR VALVE	WSDOT	WASHINGTON STATE
H, HOR	HORIZONTAL	POC	POINT OF CURVE		DEPARTMENT
HMA	HOT MIX ASPHALT	PRC	POINT OF REVERSE CURVATURE		OF TRANSPORTATION
		PT	POINT OF TANGENCY	Δ	DELTA
		PVC	POLYVINYL CHLORIDE		

GENERAL NOTES

- ALL WORKMANSHIP AND MATERIAL SHALL BE IN ACCORDANCE WITH DISTRICT STANDARDS AND/OR THE ENGINEERING DESIGN AND CONSTRUCTION STANDARDS AND THE MOST CURRENT EDITION OF THE WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION. IN CASES OF CONFLICT, THE MOST STRINGENT STANDARD SHALL APPLY.
- THE CONTRACTOR SHALL BE IN COMPLIANCE WITH ALL SAFETY STANDARDS AND REQUIREMENTS AS SET FORTH BY OSHA, WISHA AND THE WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES.
- ALL APPROVALS AND PERMITS REQUIRED BY THE DISTRICT SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION (ALL APPLICABLE "TC "PLANS IN THE STANDARD PLANS) AND/OR THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). PRIOR TO INTERRUPTION OF ANY TRAFFIC, AN APPROVED TRAFFIC CONTROL PLAN IS REQUIRED. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
- IF CONSTRUCTION IS TO TAKE PLACE IN THE DISTRICT OR COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE DISTRICT OR COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS. A COPY OF THE RIGHT-OF-WAY PERMIT MUST BE SUBMITTED TO THE DISTRICT PRIOR TO THE START OF CONSTRUCTION.
- A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE DISTRICT PRIOR TO THE START OF CONSTRUCTION.
- APPROXIMATE LOCATIONS OF EXISTING UTILITIES HAVE BEEN OBTAINED FROM AVAILABLE RECORDS AND ARE SHOWN FOR CONVENIENCE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF LOCATIONS AND TO AVOID DAMAGE TO ANY ADDITIONAL UTILITIES NOT SHOWN. IF CONFLICTS WITH EXISTING UTILITIES ARISE DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE DISTRICT ENGINEER AND ANY CHANGES REQUIRED SHALL BE APPROVED BY THE DISTRICT ENGINEER PRIOR TO COMMENCEMENT OF THE AFFECTED CONSTRUCTION.
- THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES, WHICH INCLUDES KEEPING THE LOCATES CURRENT. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION AND AFTER THE LOCATES ARE COMPLETED THE CONTRACTOR IS RESPONSIBLE TO MAINTAIN MARKS THROUGH CONSTRUCTION.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO KEEP A COPY OF THE APPROVED SET OF PLANS ON SITE. ALSO, A CURRENT RED-LINE (CHANGE TO THE PLAN) DRAWING OF THE APPROVED PLAN INDICATING CHANGES SHALL BE KEPT ON THE CONSTRUCTION SITE AT ALL TIMES.
- ALL SURVEYING AND STAKING SHALL BE PERFORMED PER THE ENGINEERING DESIGN AND CONSTRUCTION STANDARDS.
- HORIZONTAL DIMENSIONS AND STATION OFFSETS ON PLAN AND PROFILE SHEETS TO PIPELINES, MANHOLES, AND OTHER FACILITIES ARE TO THE CENTERLINES OF THOSE FACILITIES UNLESS SPECIFICALLY NOTED OTHERWISE. INVERT ELEVATIONS IN MANHOLES AND OTHER STRUCTURES IDENTIFIED IN THE PLANS REFERS TO THE ELEVATION AT THE CENTER OF THE STRUCTURE.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR FURNISHING, INSTALLING, AND MAINTAINING WARNING SIGNS AND DEVICES NECESSARY TO SAFEGUARD THE GENERAL PUBLIC DURING WORKING AND NON-WORKING HOURS.
- CONTRACTOR TO PROTECT EXISTING MONUMENTS DURING CONSTRUCTION. ANY DAMAGE TO MONUMENTS WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE BY A LICENSED SURVEYOR.
- CONTRACTOR SHALL POTHOLE THE CONNECTION TO EXISTING WATER MAIN LOCATIONS TO VERIFY HORIZONTAL AND VERTICAL LOCATION AND PIPE MATERIAL PRIOR TO PROCURING FITTINGS FOR THE CONNECTION.
- PROTECT ALL IMPROVEMENTS NOT MARKED FOR REMOVAL.
- OVERHEAD POWER AND UTILITY WIRES ARE LOCATED THROUGHOUT THE PROJECT, CONTRACTOR SHALL US CONSTRUCTION METHODS TO AVOID IMPACTS TO THESE UTILITIES.

WATER UTILITY NOTES

- UNLESS OTHERWISE IDENTIFIED IN THE APPROVED CONSTRUCTION PLANS ALL WATER MAINS SHALL BE DUCTILE IRON, STANDARD CLASS 52 AND INSTALLED PER AWWA STANDARD C600.
- GATE VALVES SHALL BE RESILIENT WEDGE, NRS (NON RISING STEM) WITH O-RINGS SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES SHALL CONFORM TO AWWA 509 OR C515. VALVES SHALL BE MUELLER, M & H, KENNEDY OR CLOW R/W.
- EXISTING VALVES SHALL BE OPERATED BY AUTHORIZED DISTRICT EMPLOYEES ONLY.
- HYDRANTS SHALL BE AS SPECIFIED AS SHOWN IN THE ENGINEERING DESIGN AND CONSTRUCTION STANDARDS (DETAIL 5081) AND SHALL BE BAGGED UNTIL SYSTEM IS APPROVED.
- ALL WATER MAINS SHALL BE CHLORINATED AND TESTED IN CONFORMANCE WITH WSDOT SECTION 7-09.3 (23) AND 7-09.3 (24).
- ALL PIPE SHALL BE INSTALLED WITH CONTINUOUS DIRECT BURY, U.S.E.12 GAUGE BLUE COATED COPPER WIRE, WRAPPED AROUND OR TAPED TO THE WATER MAIN. LOW VOLTAGE GREASE TYPE SPLICE KITS OR EPOXY KITS MAY BE USED ON TRACER WIRE. CONTINUITY TESTING OF THE WIRE WILL BE DONE BY THE DISTRICT.
- THE DISTRICT WILL BE GIVEN 72 HOURS' NOTICE PRIOR TO SCHEDULING A WATER SYSTEM SHUTDOWN. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION", CONNECTION POINTS SHALL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED 72 HOURS PRIOR TO DISTRIBUTING SHUT-DOWN NOTICES.
- VERTICAL AND HORIZONTAL SEPARATION BETWEEN WATER AND SEWER MAINS SHALL BE MAINTAINED PER 5-35.4 AND 5-35.5 IN THE ENGINEERING DESIGN AND CONSTRUCTION STANDARDS.
- ALL WATER MAINS SHALL HAVE RESTRAINED JOINT FITTINGS (MEGA-LUG OR APPROVED EQUAL).
- IN AREAS WHERE NATIVE SOILS HAVE BEEN DISTURBED WITHIN 10 FEET BEHIND A BEND OR FITTING, RESTRAINED JOINT PIPE SHALL BE USED IN LIEU OF THRUST BLOCKING.
- ALL TAPS (WET TAPS AND SERVICE TAPS) TO THE DISTRICT'S NEW AND EXISTING WATER MAINS WILL BE PERFORMED BY DISTRICT FORCES.
- WATER METER LOCATIONS MAY BE ADJUSTED IN THE FIELD. COORDINATE WITH ENGINEER FOR FINAL LOCATION.
- WATER SERVICES SHALL BE INSTALLED UNDER CULVERTS OR DRAINAGE DITCHES, IF NEEDED. DEPTH MAY VARY FROM 21" TO 36" MAXIMUM AS REQUIRED AT CROSSING.
- CONTRACTOR SHALL PROVIDE STAGING/SEQUENCING PLAN AT PRECONSTRUCTION CONFERENCE FOR REVIEW AND APPROVAL BY DISTRICT AND ENGINEER.

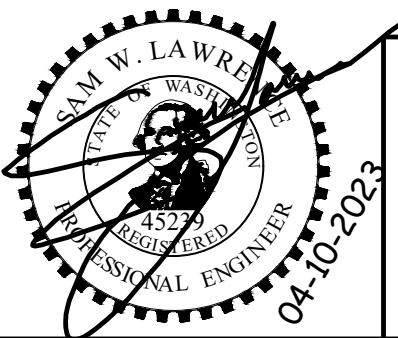
TEMPORARY EROSION AND SETTLEMENT CONTROL NOTES

- TEMPORARY EROSION CONTROL/WATER POLLUTION MEASURES SHALL BE REQUIRED IN ACCORDANCE WITH THE ENGINEERING DESIGN AND CONSTRUCTION STANDARDS. AT NO TIME WILL SILTS AND DEBRIS BE ALLOWED TO DRAIN INTO AN EXISTING OR NEWLY INSTALLED STORMWATER FACILITY UNLESS SPECIAL PROVISIONS HAVE BEEN APPROVED.

ALL REFERENCES TO "STANDARD SPECIFICATIONS" PERTAIN TO THE 2023 WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION.

ALL REFERENCES TO "SPECIAL PROVISIONS" PERTAIN TO THE PROJECT MANUAL.

NO.	DATE	BY	APPR.	REVISIONS	<div>Approved By</div>	9LAK010100ELW_COVR.dwg	
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						ENGINEERING MANAGER	DATE
						DESIGNED BY	DATE
						CES	04/2023
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					SWL	04/2023	
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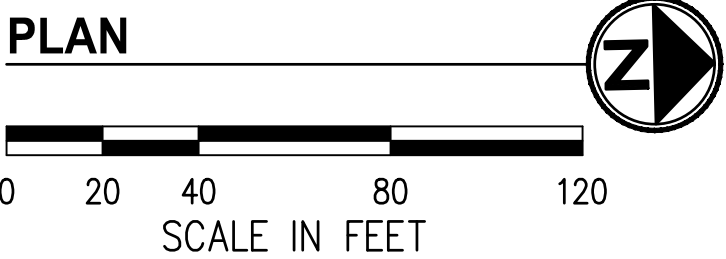
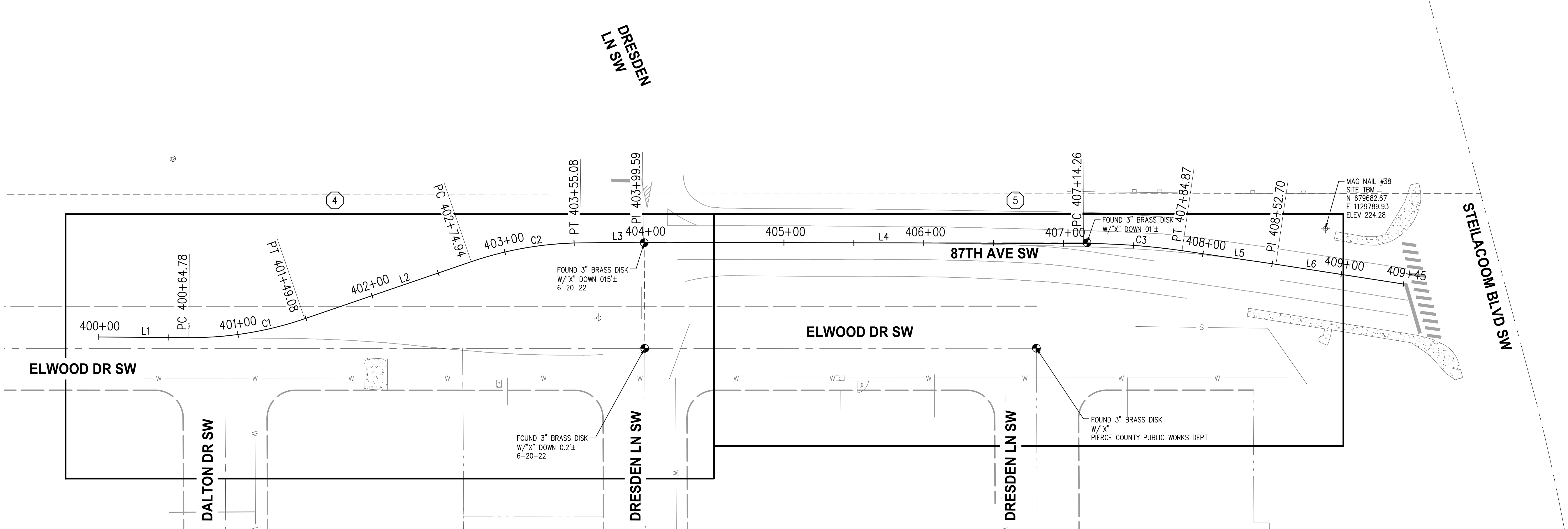


LAKESWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION

LEGEND, ABBREVIATIONS &
GENERAL NOTES

KPG PROJ. No. 9LAK010100 SHT 2 OF 12

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SHEET INDEX

WATER PLAN & PROFILE

HORIZONTAL DATUM

NAD 1983
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS
OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT
ARE US SURVEY FEET.
THE CONSTRUCTION ALIGNMENTS SHOWN ARE THE BASIS FOR THE
PROPOSED CROWNLINE. IN NO CIRCUMSTANCE DOES THE CONSTRUCTION
ALIGNMENT PARALLEL THE RIGHT-OF-WAY CENTERLINE.

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS
OBSERVATIONS USING WSRN AND GEOID 2012A.

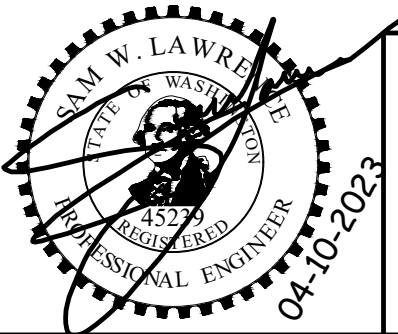
SAME ALIGNMENT IS UTILIZED AS CITY OF LAKEWOOD ANGLE LN/ELWOOD
DRIVE PROJECT. FOR SURVEY CONTROL POINTS SEE CITY OF LAKEWOOD
ALIGNMENT PLANS

ELWOOD DR SW CL

NUMBER	START STA	NORTHING	EASTING	LENGTH	BRNG/DELTA	RADIUS	PI STA	TAN
L1	400+00.00	678803.80	1129846.43	64.78'	N 1°46'21" E			
C1	400+64.78	678868.55	1129848.43	84.31'	19°19'18"	250.00'	401+07.33	42.56'
L2	401+49.08	678951.66	1129836.92	125.86'	N 17°32'57" W			
C2	402+74.94	679071.66	1129798.97	80.14'	18°22'03"	250.00'	403+15.36	40.42'
L3	403+55.08	679150.61	1129787.36	44.51'	N 0°49'05" E			
L4	403+99.59	679195.11	1129787.99	314.67'	N 1°31'44" E			
C3	407+14.26	679509.67	1129796.39	70.61'	8°05'31"	500.00'	407+49.62	35.37'
L5	407+84.87	679579.89	1129803.24	67.83'	N 9°37'15" E			
L6	408+52.70	679646.76	1129814.58	92.29'	N 10°10'24" E			

NO.	DATE	BY	APPR.	REVISIONS

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PROJECT MANAGER	DATE	DESIGNED BY
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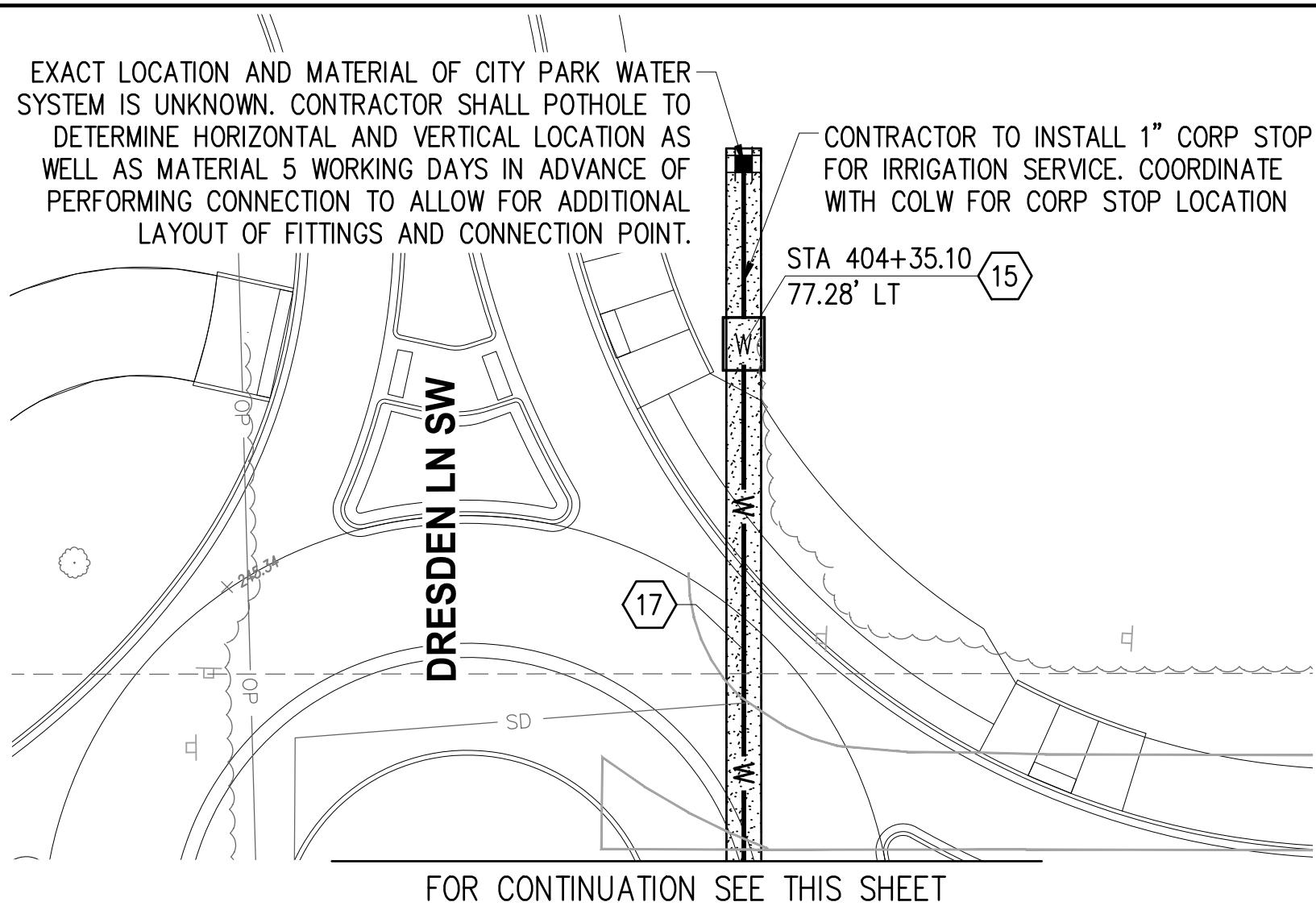
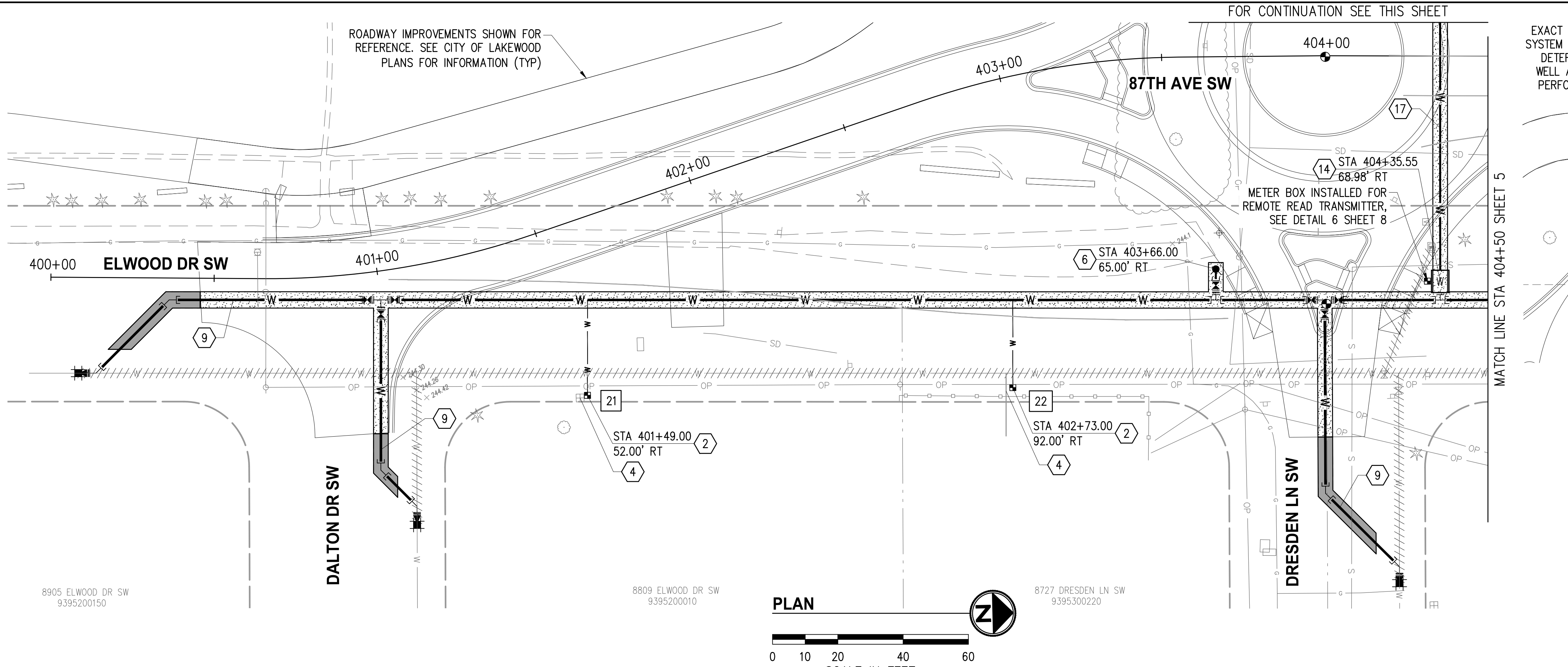
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LAKEWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION

SURVEY CONTROL &
ALIGNMENT DATA

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GENERAL NOTES

- CONTRACTOR SHALL POTHOLE THE CONNECTION TO EXISTING WATER MAIN LOCATIONS TO VERIFY HORIZONTAL AND VERTICAL LOCATION AND PIPE MATERIAL PRIOR TO PROCURING FITTINGS FOR THE CONNECTION.
- PROTECT ALL IMPROVEMENTS NOT MARKED FOR REMOVAL.
- THIS PLAN WAS PREPARED FOR THE CONTRACTOR'S CONVENIENCE IN LOCATING, PROTECTING AND AVOIDING CONFLICTS WITH EXISTING UTILITIES. IT IS BASED ON BEST AVAILABLE INFORMATION BUT IS NOT INTENDED TO BE A COMPLETE RECORD. CONTRACTOR IS RESPONSIBLE FOR INDEPENDENTLY VERIFYING THE LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION.
- WATER METER LOCATIONS MAY BE ADJUSTED IN THE FIELD. COORDINATE WITH THE ENGINEER FOR FINAL LOCATION.
- FOR SCHEMATIC CONNECTIONS DETAILS SEE SHEETS 6-7.
- ALL HORIZONTAL AND VERTICAL BENDS SHALL BE RESTRAINED PER LWD STD DETAILS 2 AND 4.

CONSTRUCTION NOTES

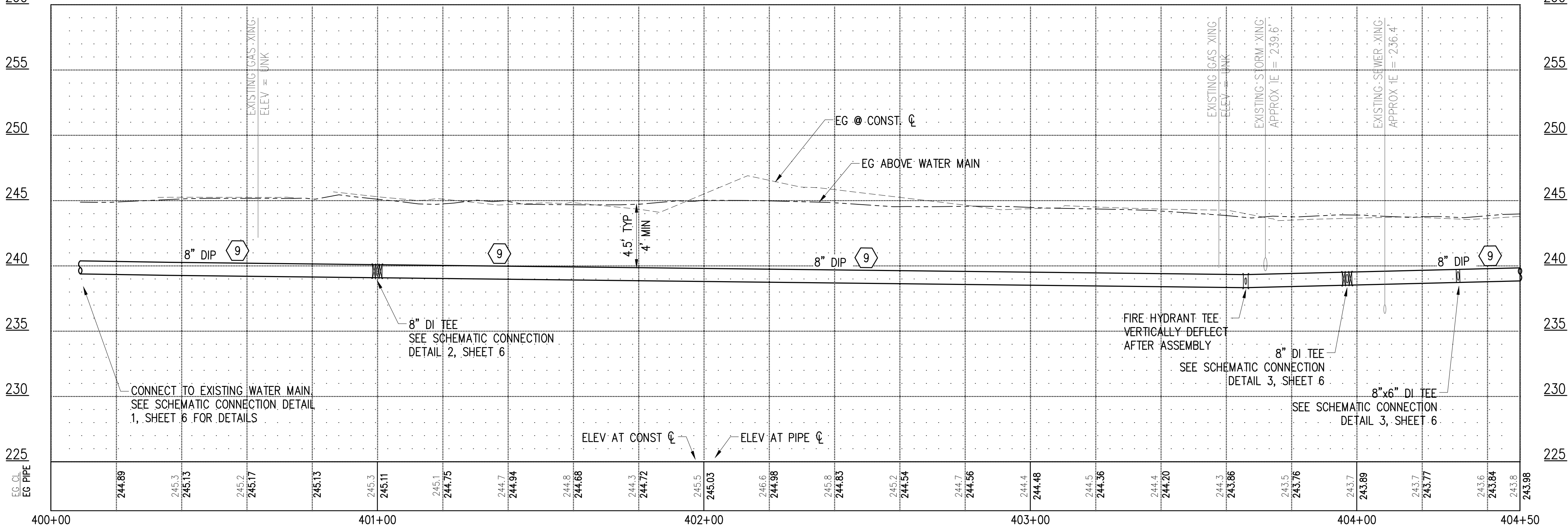
- INSTALL NEW 5/8" OR 1" WATER SERVICE, UNLESS NOTED OTHERWISE, PER LWD STD DETAIL 7A. RECONNECT EXISTING CUSTOMER PIPING AFTER NEW METER SETTER IS INSTALLED, METER SIZE SHALL BE PER TABLE THIS SHEET.
- REMOVE METER/METER BOX AND ABANDON EXISTING SERVICE LINE.
- INSTALL NEW FIRE HYDRANT PER LWD STD DETAIL 9.
- INSTALL NEW 8" DIAM. CL 52 DUCTILE IRON PIPE PER LWD STD TRENCH DETAIL 6.
- INSTALL 6" METER VAULT PER DETAIL 6, SHEET 8.
- INSTALL 6" DOUBLE CHECK-VALVE ASSEMBLY PER DETAIL 7, SHEET 8.
- INSTALL NEW 6" DIAM. CL 52 DUCTILE IRON PIPE PER LWD STD TRENCH DETAIL 6.

LEGEND

SEE SHEET 2 FOR LEGEND

METER SCHEDULE

#	METER SIZE	ADDRESS	COMMENTS
21	5/8"	8809 ELWOOD DR SW	
22	5/8"	8727 DRESDEN LN SW	

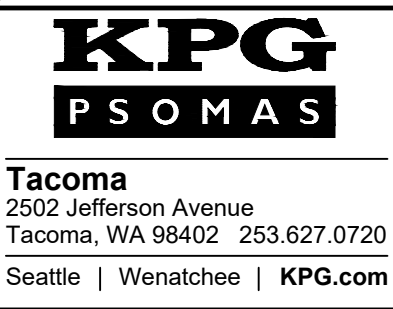
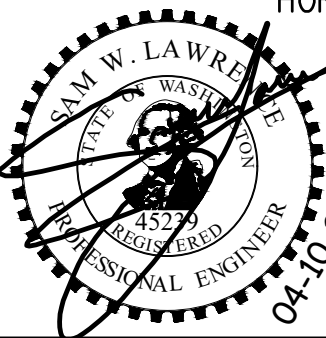


PROFILE

HOR: 1"=20' VER: 1"=5'

NO.	DATE	BY	APPR.	REVISIONS

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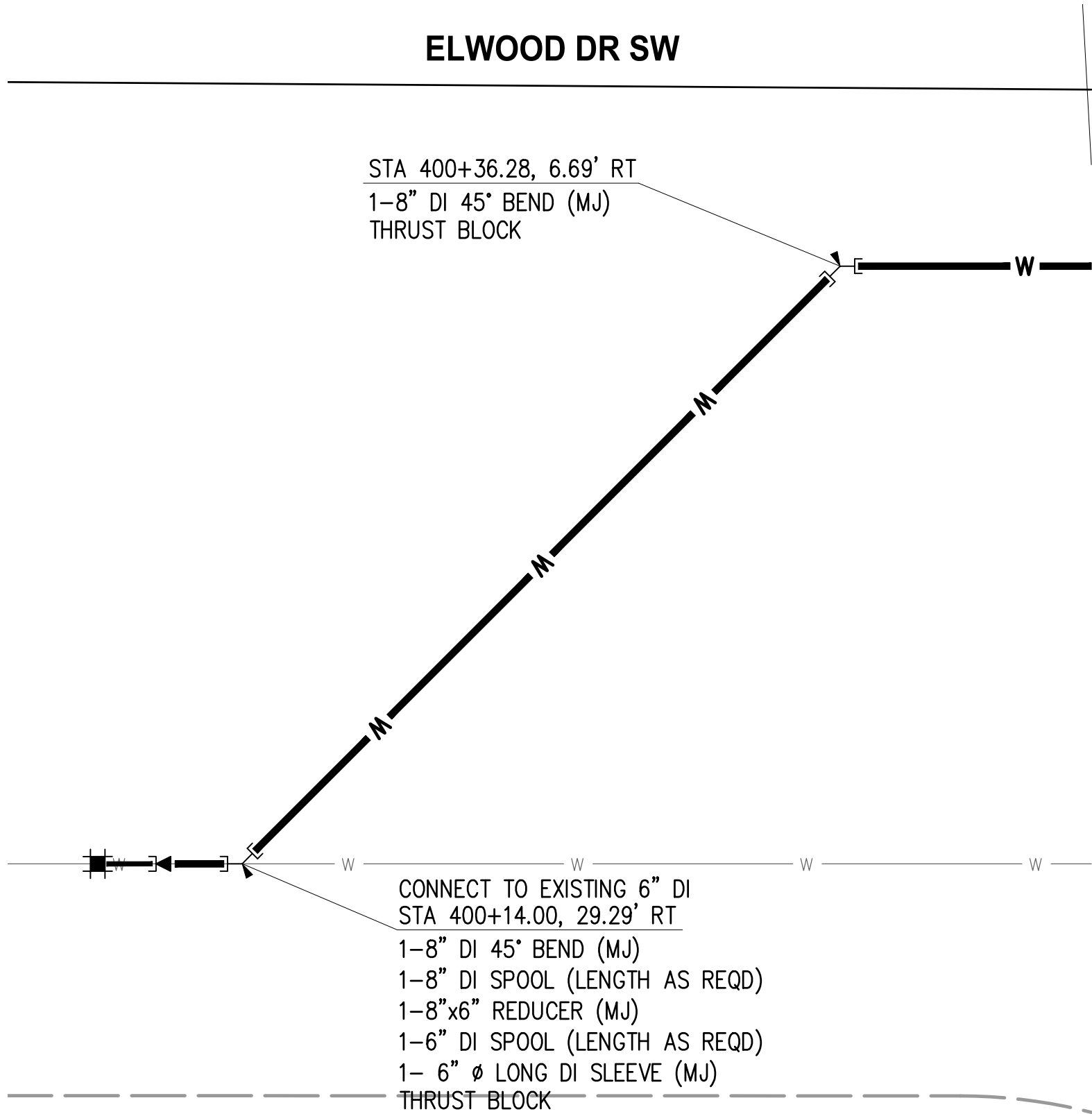


LAKESWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION

WATER PLAN & PROFILE
ELWOOD DR SW
STA 400+00 TO STA 404+50

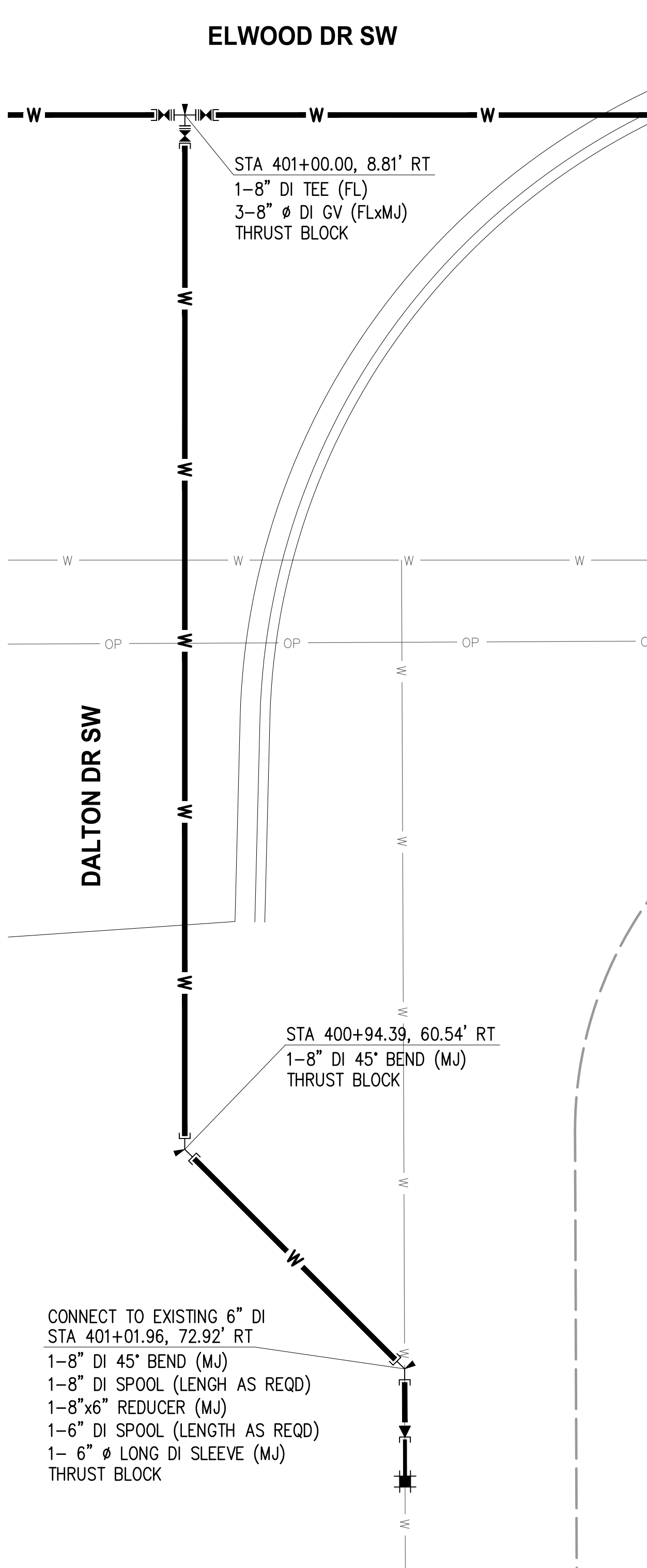
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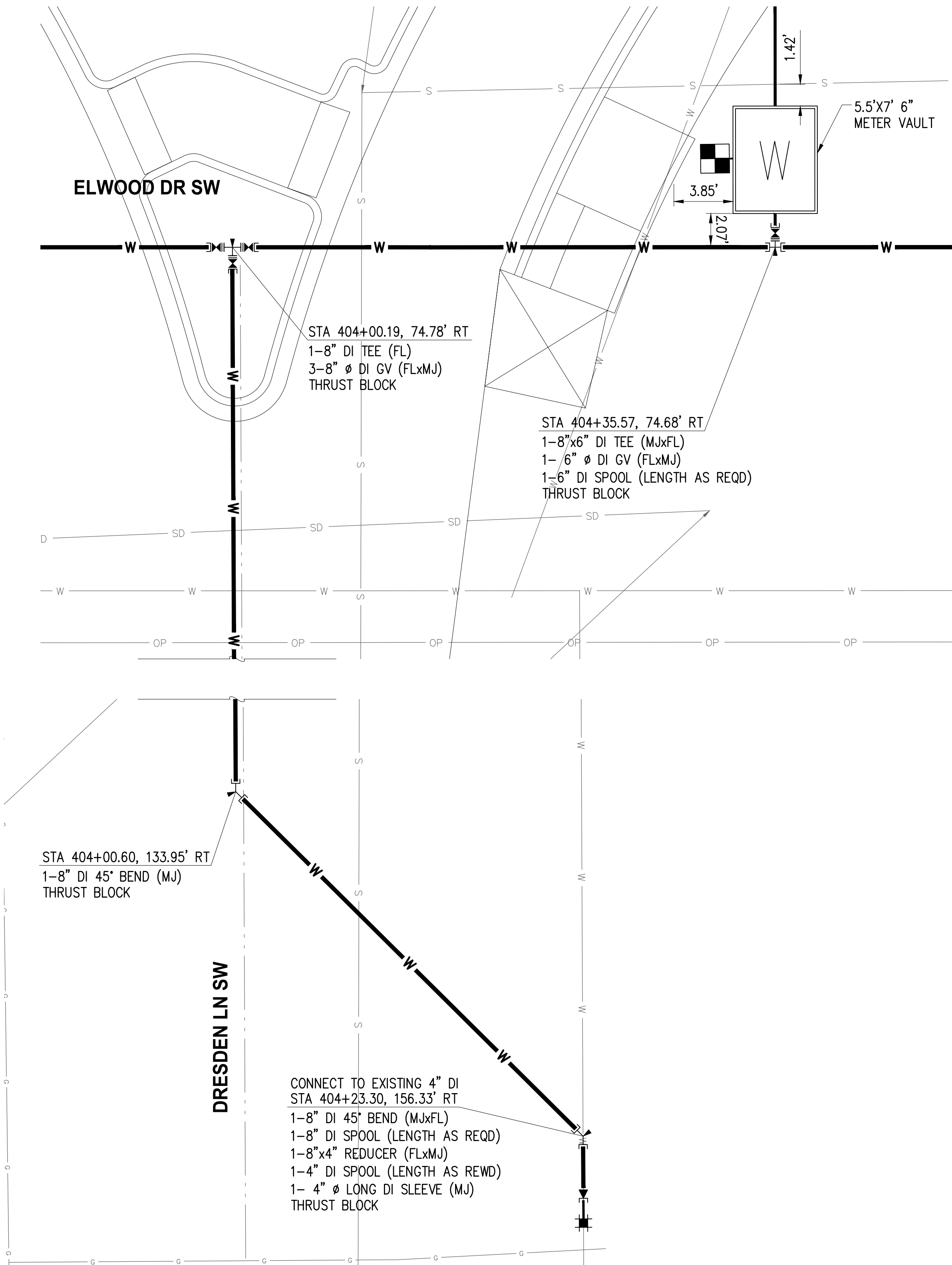
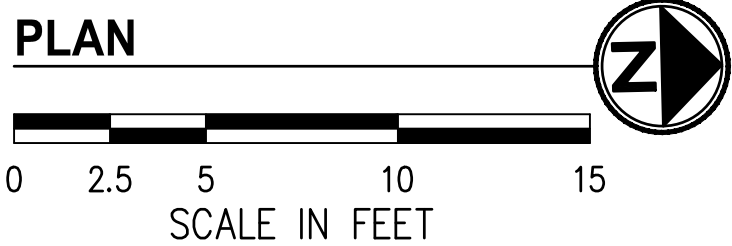
STA 400+14.00 CONNECTION DETAIL
NTS

1



DALTON DR SW CONNECTION DETAIL
NTS

2



DRESDEN LN SW CONNECTION DETAIL
NTS

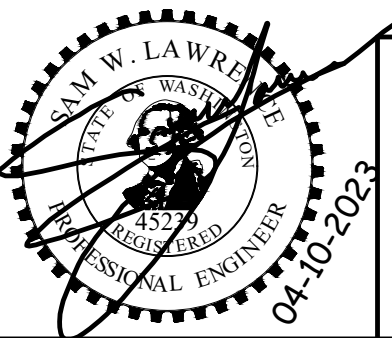
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GENERAL NOTES

1. ALL HORIZONTAL AND VERTICAL BENDS SHALL BE RESTRAINED PER LWD STD DETAILS 2 AND 4.

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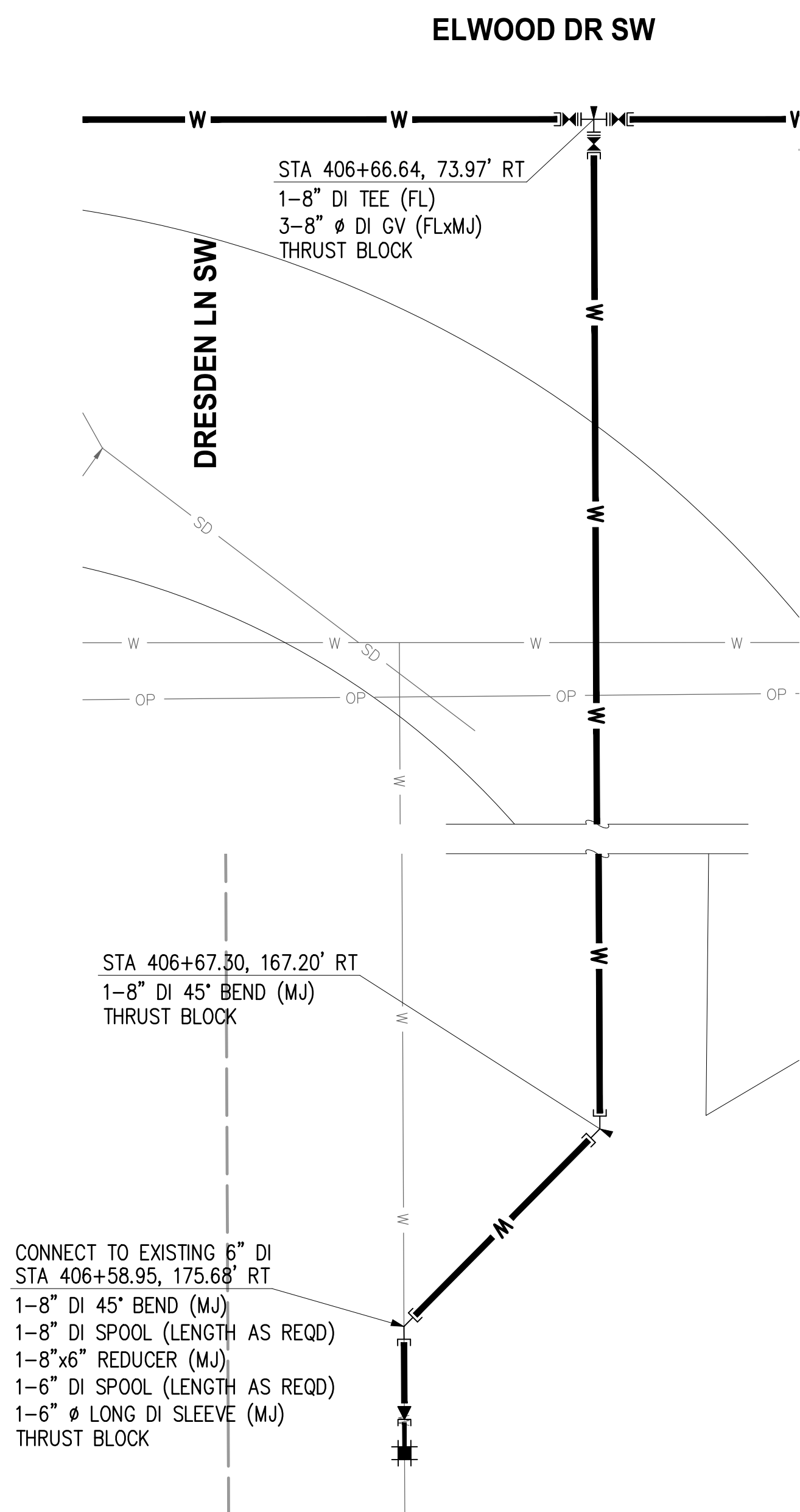
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**LAKESIDE WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION**

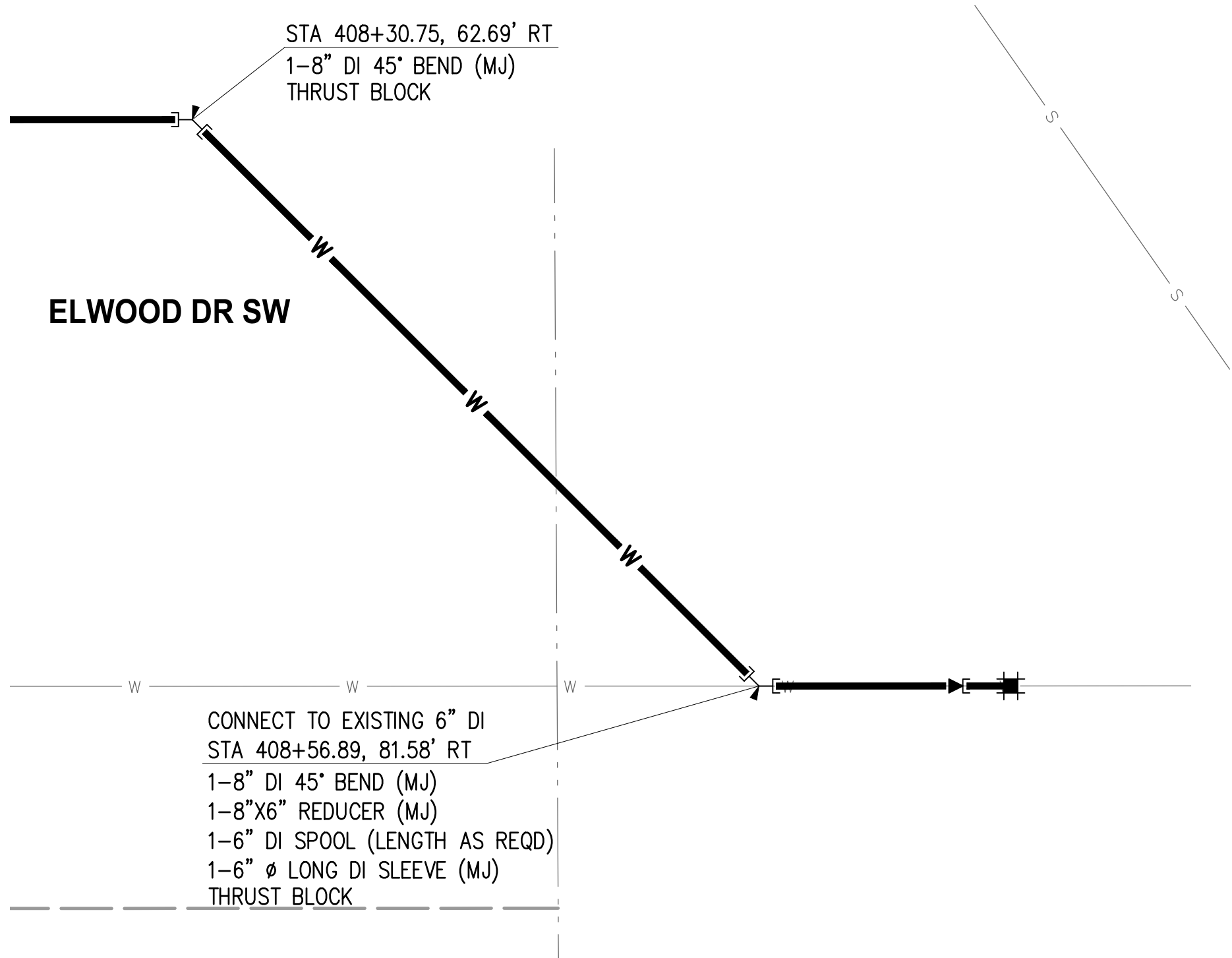
SCHEMATIC CONNECTION DETAILS ELWOOD DR SW	
KPG PROJ. No. 9LAK010100	SHT <u>6</u> OF <u>12</u>

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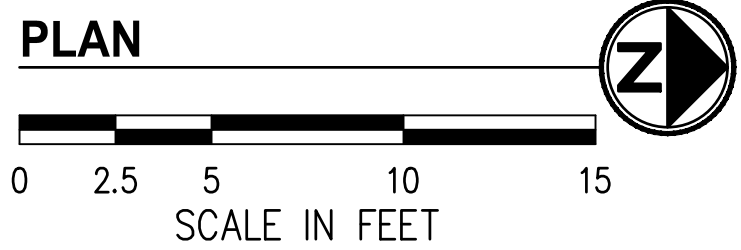
DRESDEN LN SW CONNECTION DETAIL
NORTHERN CONNECTION
NTS

4



STA 408+56.89 CONNECTION DETAIL
NTS

5



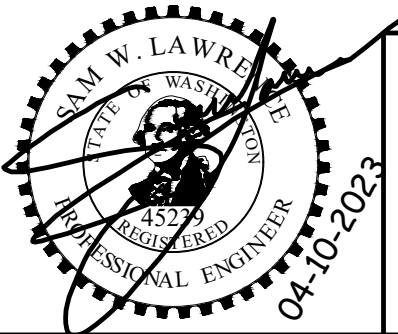
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1. ALL HORIZONTAL AND VERTICAL BENDS SHALL BE RESTRAINED PER LWD STD DETAILS 2 AND 4.

NO.	DATE	BY	APPR.	REVISIONS

Approved By	
ENGINEERING MANAGER	DATE
PROJECT MANAGER	DATE
PROJECT ENGINEER	DATE

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CES	04/2023
DESIGNED BY	DATE
CES	04/2023
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SWL	04/2023
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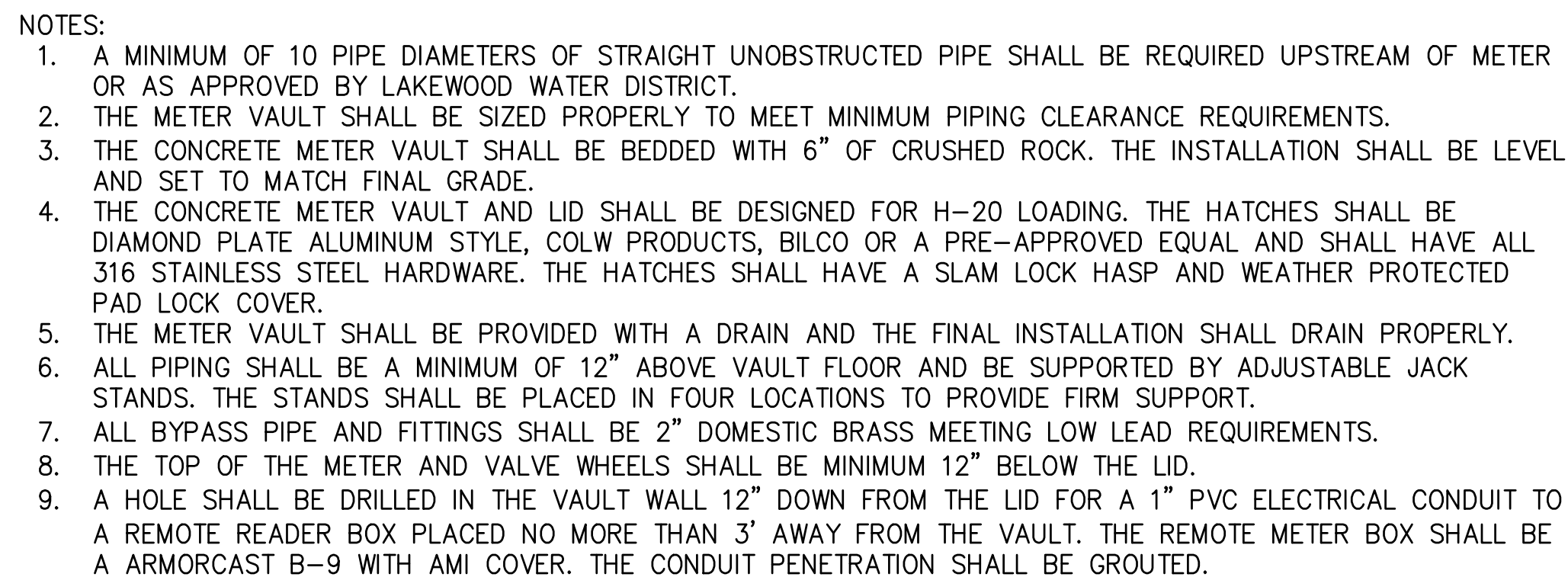
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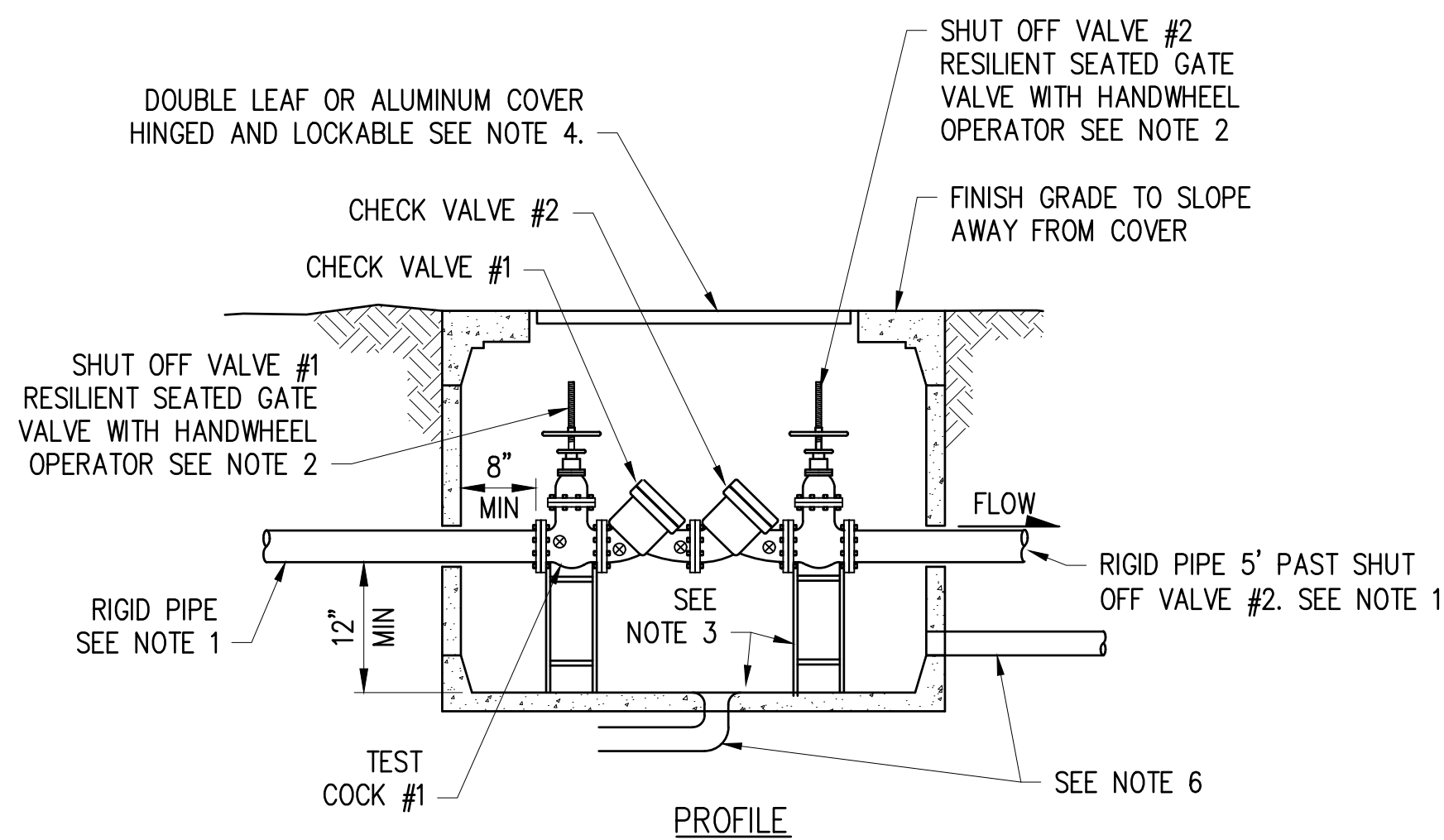


**LAKEWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION**

SCHEMATIC CONNECTION DETAILS ELWOOD DR SW	
KPG PROJ. No. 9LAK010100	SHT <u>7</u> OF <u>12</u>



6IN METER DETAIL

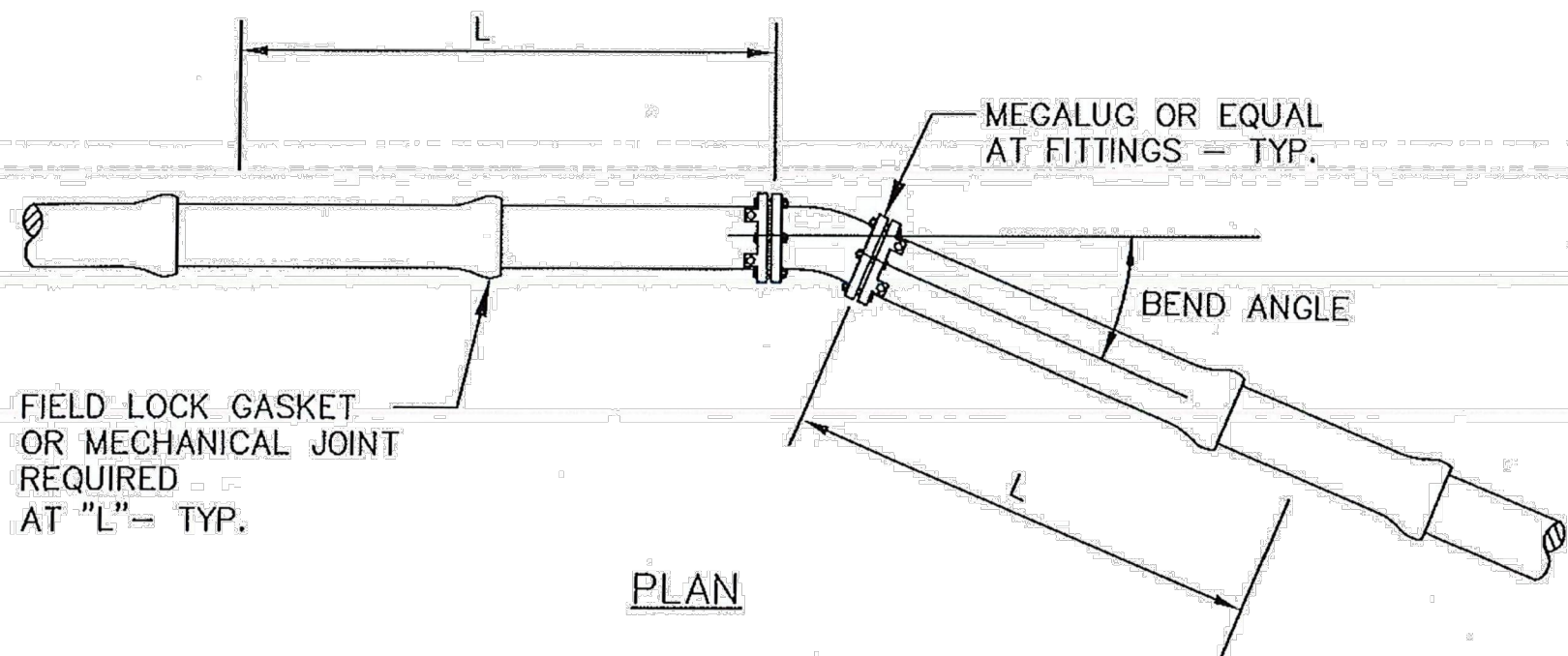


- NOTES:
1. RIGID PIPE SHALL BE DUCTILE IRON PIPE.
 2. DCDA SHALL BE A FEBCO 850 LARGE UNLESS OTHERWISE APPROVED BY THE CITY AND SHALL INCLUDE SHUT OFF VALVES 1 AND 2 AS PART OF THE UNIT. 6" CLEARANCE SHALL BE PROVIDED WITH THE VALVE OPEN.
 3. DCDA SHALL BE SUPPORTED WITH ADEQUATE SUPPORT PEDESTAL(S).
 4. VAULT, DOORS OR COVERS AND SUPPORT ASSEMBLIES SHALL BE DESIGNED AS REQUIRED, VAULT DOORS MUST FLUSH MOUNT AND ACCOMMODATE BACKFLOW ASSEMBLY REMOVAL AND VALVE ACCESS.
 5. TEST COCK #1 SHALL BE UPSTREAM OF SHUT OFF VALVE #1 AND IS PART OF THE ASSEMBLY.
 6. DRAIN PORT MUST DRAIN BY GRAVITY TO ATMOSPHERE OR CONNECT TO STORM DRAINAGE. DRAINAGE MAY BE PROVIDED AS SHOWN OR AS FLOOR DRAIN.

6IN DOUBLE CHECK VALVE ASSEMBLY DETAIL

NO.	DATE	BY	APPR.	REVISIONS	<div>Approved By</div> <div>ENGINEERING MANAGER DATE</div> <div>PROJECT MANAGER DATE</div> <div>PROJECT ENGINEER DATE</div>		<div>9LAK010100ELW_DET03.dwg</div> <div>FILENAME 04/2023</div> <div>DESIGNED BY DATE</div> <div>CES 04/2023</div> <div>DRAWN BY DATE</div> <div>SWL 04/2023</div> <div>CHECKED BY DATE</div>	<div></div>	<div></div> <div>Tacoma 2502 Jefferson Avenue Tacoma, WA 98402 253.627.0720 Seattle Wenatchee KPG.com</div>	<div>BID DOCUMENT</div>	<div></div>	<div>LAKEWOOD WATER DISTRICT ANGLE LN SW & ELWOOD DR SW WATER MAIN RELOCATION</div>	<div>PROJECT DETAILS</div> <div>KPG PROJ. No. 9LAK010100</div> <div>SHT 8 OF 12</div>	
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HORIZONTAL BEND RESTRAINED LENGTH (L) REQUIRED EACH LEG PAST FITTING (FT)					
PIPE SIZE	TEE OR PLUG	90°	45°	22.5°	11.25°
6"	79	38	16	8	4
8"	103	50	21	10	5
10"	124	59	25	12	6
12"	113	54	23	11	6
16"	145	68	29	14	7

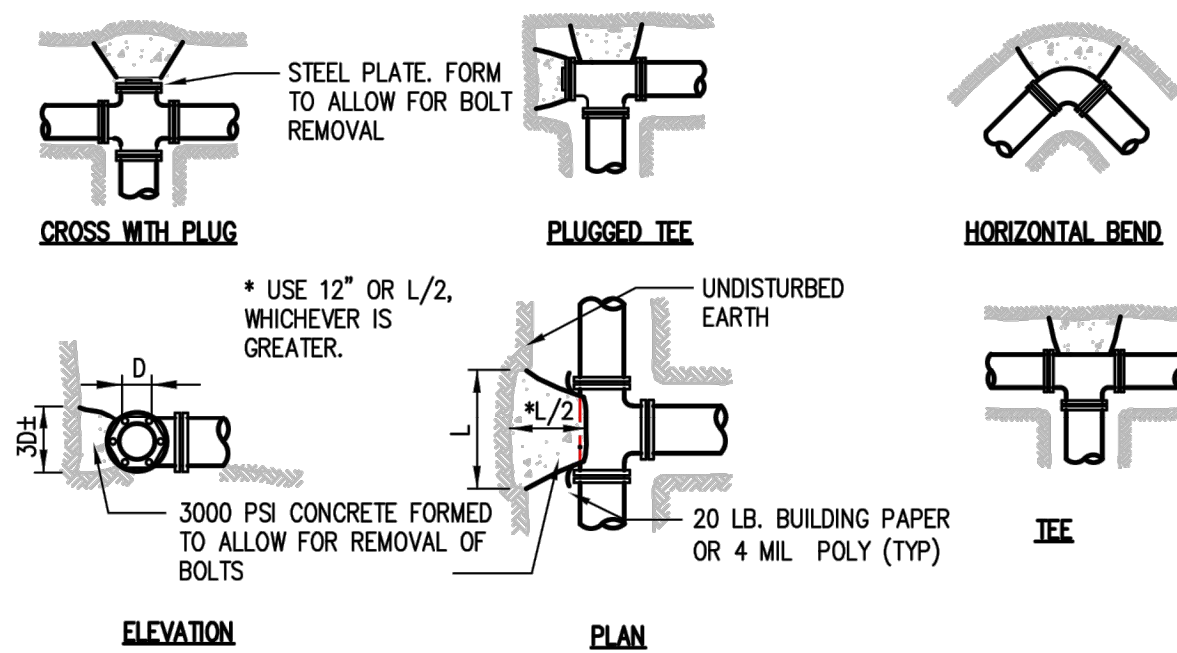
NOTES:

1. RESTRAINED LENGTH SHALL BE ADJUSTED IF CONDITIONS DIFFER FROM ASSUMPTIONS. IF RESTRAINED LENGTH SHOWN IS NOT ACHIEVABLE, THRUST BLOCKS SHALL ALSO BE USED. SEE DETAIL 3.
2. RESTRAINED LENGTHS CAN BE ADJUSTED WITH SITE SPECIFIC SOILS INFORMATION, ENGINEER DESIGN AND DISTRICT APPROVAL.
3. RESTRAINED LENGTHS CAN BE ADJUSTED WITH SITE SPECIFIC SOILS INFORMATION, ENGINEER DESIGN AND DISTRICT APPROVAL.
4. MULTIPLE FITTINGS IN MULTIPLE PLANES SHALL BE DESIGNED AND STAMPED ON AN INDIVIDUAL BASIS BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF WASHINGTON.

ASSUMPTIONS:

1. TEST PRESSURE 200 PSI.
2. LAYING CONDITION 3.
3. SAND-SILT SOIL DESIGNATION.
4. COVER ON 6-10" DIA. AT 3 FEET; COVER ON 12-16" DIA. AT 4 FEET.
5. SAFETY FACTOR 1.5
6. VALUES DEVELOPED WITH DIPRA THRUST RESTRAINT CALCULATOR.

2 HORIZONTAL BEND RESTRAINT



THRUST BLOCK TABLE					
PIPE SIZE	TEE OR END PLUG	90°	45°	22 1/2°	11 1/4°
4" OR 6"	3	4	2	2	2
8"	6	7	4	2	2
12"	12	16	9	5	3
16"	21	29	16	8	4

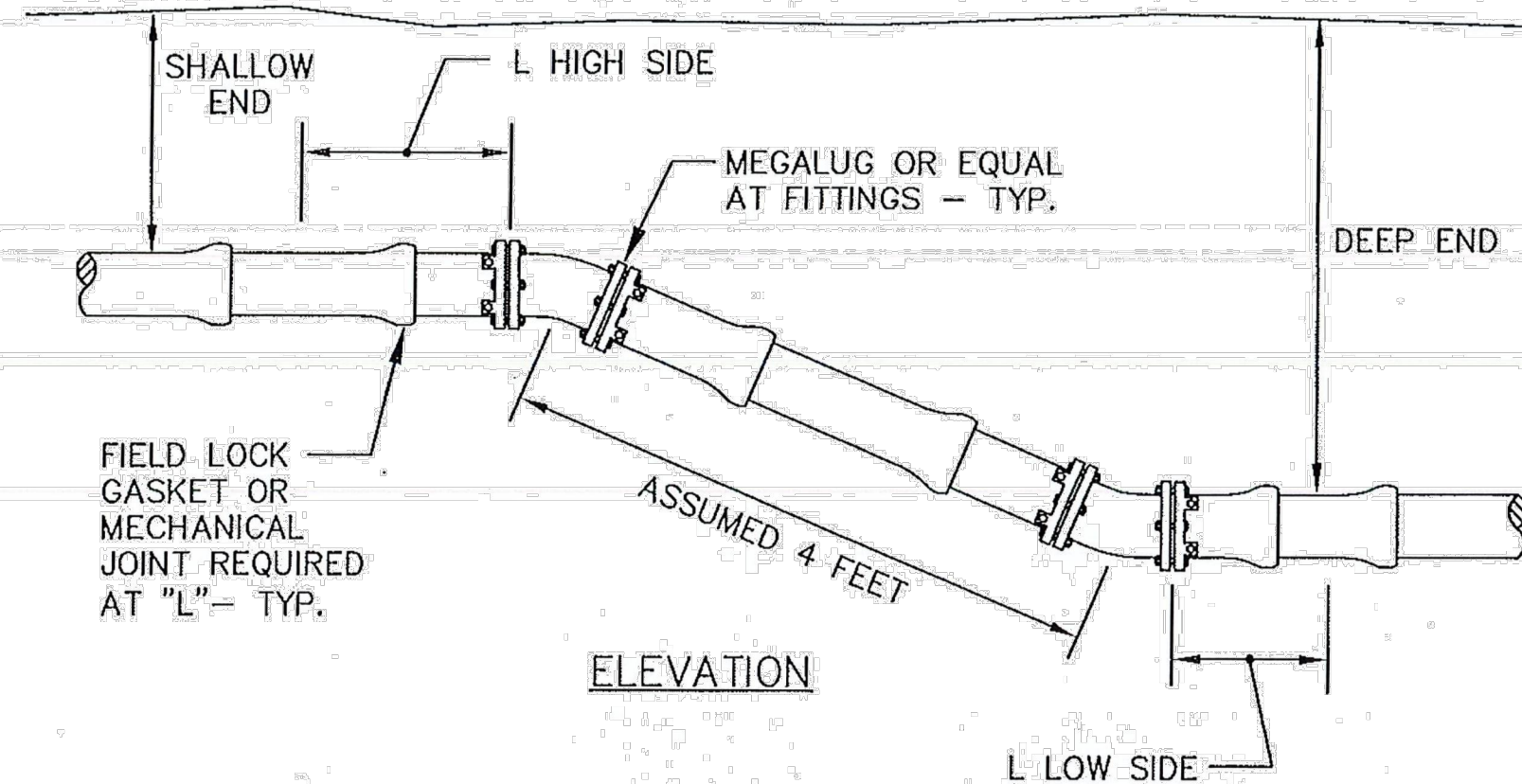
MINIMUM BEARING AREA AGAINST UNDISTURBED EARTH (SQUARE FEET)

NOTES:

1. BEARING AREA OF CONC. THRUST BLOCK BASED ON 200 PSI PRESSURE AND SOIL BEARING LOAD OF 2000 POUNDS PER SQUARE FOOT.
2. AREAS MUST BE ADJUSTED FOR OTHER SIZE PIPES, PRESSURES AND SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE AND HAVE A MINIMUM OF 1/2 SQUARE FOOT BEARING AGAINST THE FITTING. SIDES SHALL BE FORMED WITH PLYWOOD OR EQUIVALENT.
4. THRUST BLOCK SHALL BEAR AGAINST FITTING ONLY AND SHALL BE CLEAR OF JOINTS TO PERMIT DISMANTLING OF JOINTS.
5. CONCRETE TO BE 3000 PSI MINIMUM. PRE-MIX CONCRETE IS PREFERRED. IF CONCRETE IS HAND MIXED THE PROPORTIONS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS. COMPRESSIVE TESTS OF "HAND MIXED" CONCRETE MAY BE REQUIRED. PRE-INSPECTION OF BLOCKING AREA REQUIRED PRIOR TO PLACEMENT OF CONCRETE.
6. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.
7. THRUST BLOCK USED ONLY WHEN SHOWN ON PLANS OR WHEN CONNECTING TO EXISTING PIPE WHERE EXISTING JOINT RESTRAINT IS UNKNOWN.

DETAIL REVISED:
FEBRUARY 2023

3 THRUST BLOCKING DETAIL
DETAIL FOR CONNECTIONS TO EXISTING MAINS ONLY



VERTICAL BEND RESTRAINED LENGTH (L) REQUIRED EACH LEG PAST FITTING (FT)						
PIPE SIZE	45°		22.5°		11.25°	
	HIGH SIDE	LOW SIDE	HIGH SIDE	LOW SIDE	HIGH SIDE	LOW SIDE
6"	64	29	30	12	14	5
8"	84	38	39	17	19	7
10"	100	46	47	21	23	9
12"	91	42	43	19	21	8
16"	118	54	56	25	27	11

NOTES:

1. RESTRAINED LENGTH SHALL BE ADJUSTED IF CONDITIONS DIFFER FROM ASSUMPTIONS. IF RESTRAINED LENGTH SHOWN IS NOT ACHIEVABLE, THRUST BLOCKS SHALL ALSO BE USED. CONTACT DISTRICT FOR THRUST BLOCKING DETAIL.
2. ALL PIPE BETWEEN VERTICAL BENDS SHALL BE RESTRAINED.
3. RESTRAINED LENGTHS CAN BE ADJUSTED WITH SITE SPECIFIC SOILS INFORMATION, ENGINEER DESIGN AND DISTRICT APPROVAL.
4. RESTRAINED LENGTHS CAN BE ADJUSTED WITH SITE SPECIFIC SOILS INFORMATION, ENGINEER DESIGN AND DISTRICT APPROVAL.
5. 90° VERTICAL BENDS ARE NOT ALLOWED.
6. MULTIPLE FITTINGS IN MULTIPLE PLANES SHALL BE DESIGNED AND STAMPED ON AN INDIVIDUAL BASIS BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF WASHINGTON.

ASSUMPTIONS:

1. TEST PRESSURE 200 PSI.
2. LAYING CONDITION 3.
3. SAND-SILT SOIL DESIGNATION.
4. SHALLOW END COVER ON 6-10" DIA. AT 3 FEET; COVER ON 12-16" DIA. AT 4 FEET.
5. LENGTH BETWEEN FITTINGS ASSUMED TO BE 4 FEET SO KNOWN LENGTH IS 2 FEET.
6. SAFETY FACTOR 1.5
7. VALUES DEVELOPED WITH DIPRA THRUST RESTRAINT CALCULATOR.

4 VERTICAL BEND RESTRAINT



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PROJECT MANAGER	DATE	LWD	04/2023
PROJECT ENGINEER	DATE	DRAWN BY	DATE
		SWL	04/2023
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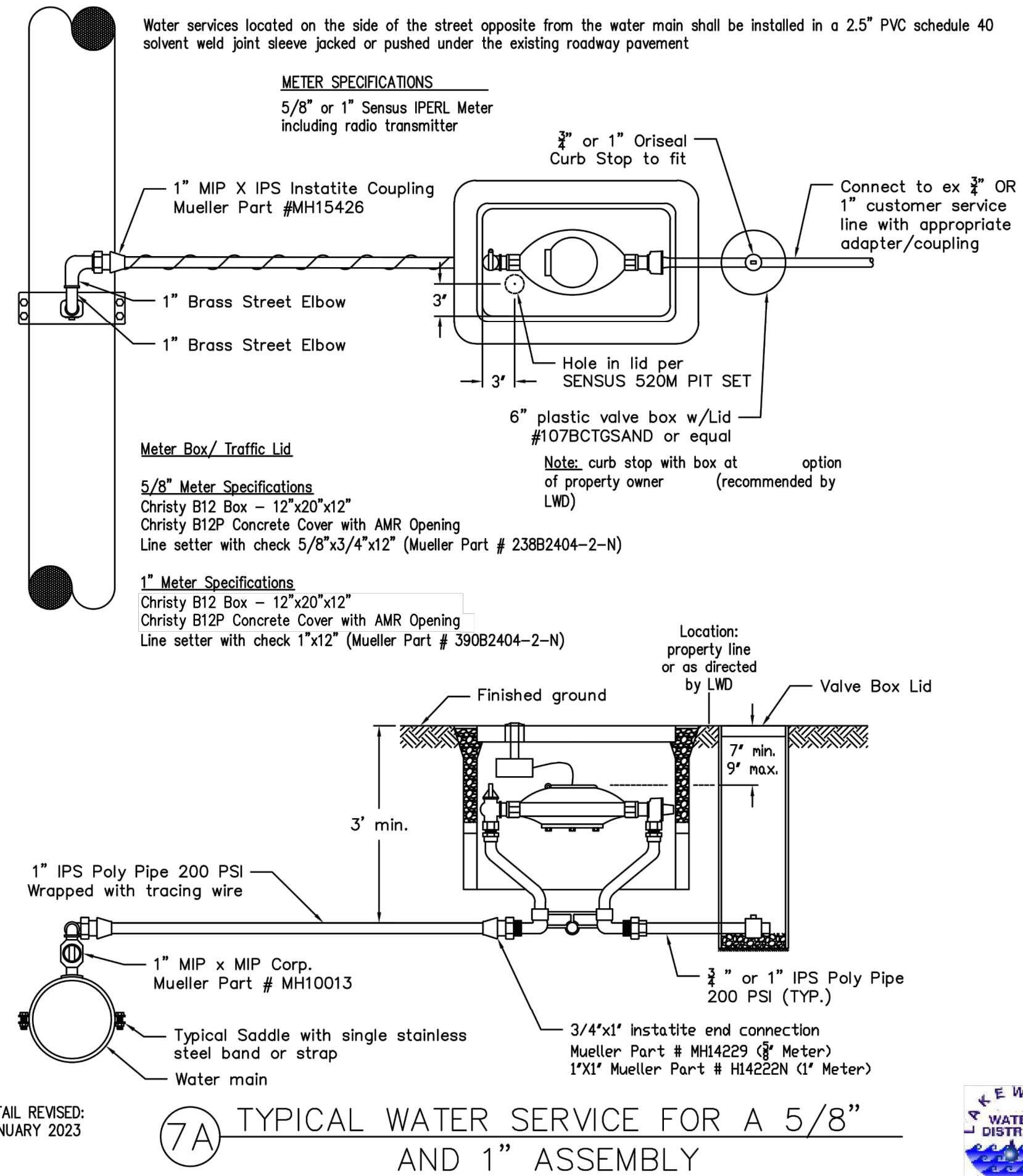
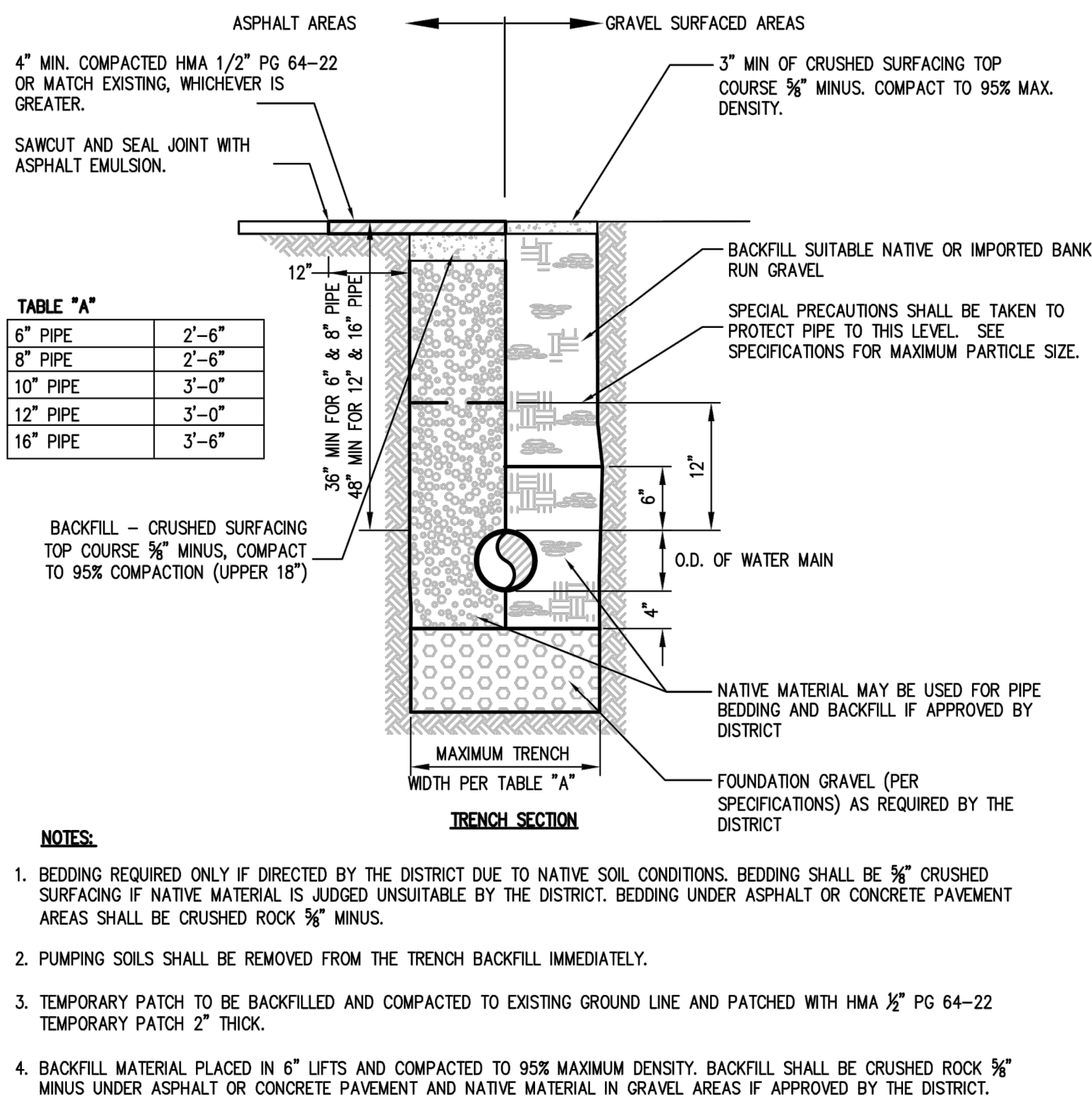
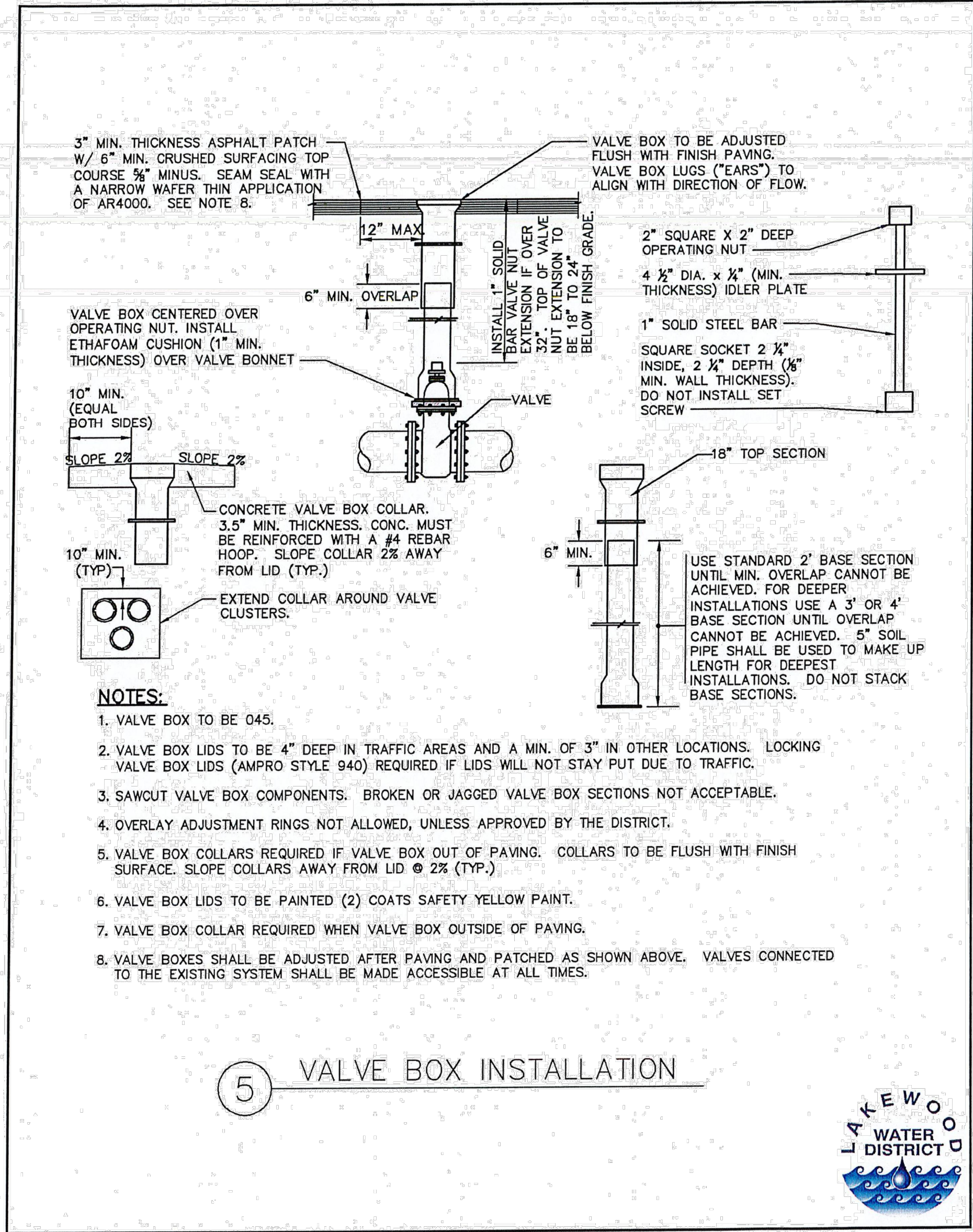


LAKEWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION

LAKEWOOD WATER DISTRICT DETAILS

KPG PROJ. No. 9LAK010100 SHT 9 OF 12

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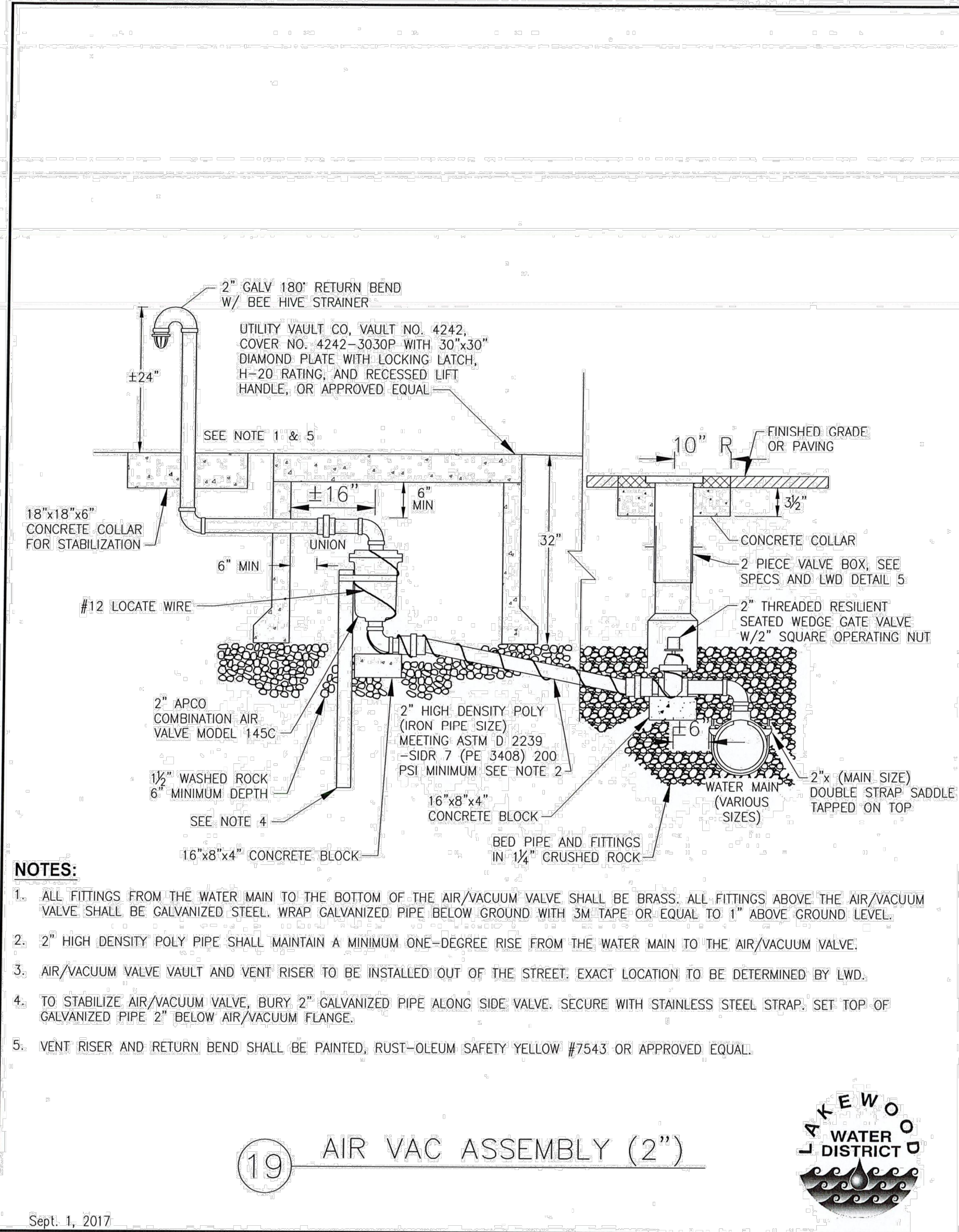
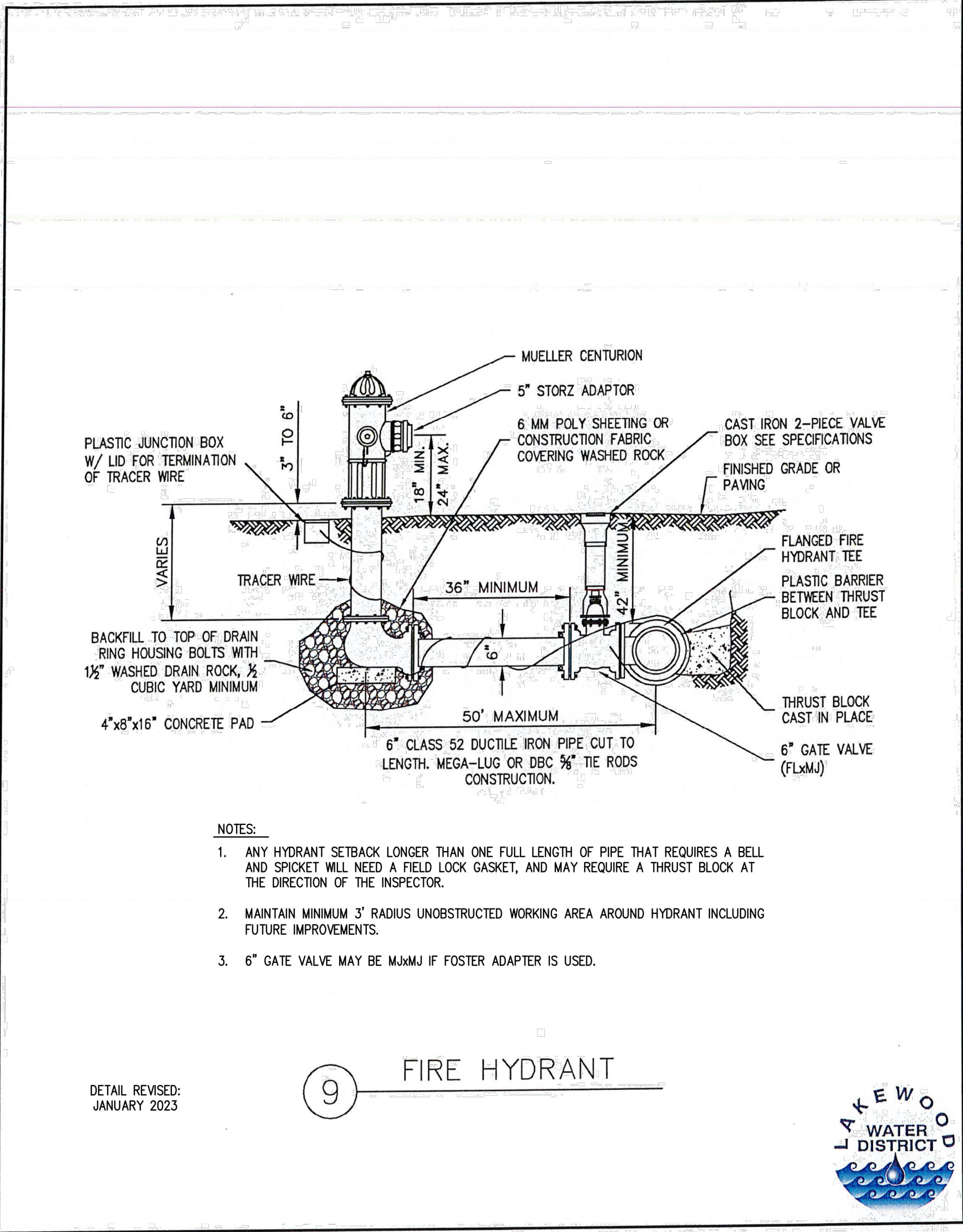


**LAKEWOOD WATER DISTRICT
ANGLE LN SW & ELWOOD DR SW
WATER MAIN RELOCATION**

LAKEWOOD WATER DISTRICT DETAILS

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LAKEWOOD WATER DISTRICT DETAILS			
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